

CLAIMS

What is claimed is:

1 1. A tunable impact absorption system for a motor vehicle
2 comprising:

3 a steering column having a first sleeve and a second sleeve, the
4 first sleeve sized to receive a portion of the second sleeve, the sleeves extending
5 between a first mounting bracket and a second mounting bracket, and a piston
6 cylinder assembly mounted between the first and second mounting brackets;

7 a plurality of igniters in communication with the piston cylinder
8 assembly, the plurality of igniters capable of releasing a pressurized fluid when
9 activated to pressurize the piston cylinder assembly;

10 a plurality of sensors mounted within the motor vehicle for signaling
11 vehicle and driver conditions; and

12 a controller in communication with the plurality of sensors and the
13 plurality of igniters, the controller activating at least one of the plurality of igniters
14 based on signals received from the plurality of sensors during an impact event.

1 2. The tunable impact absorption system of claim 1 further
2 comprising a collapsible steering shaft adapted to steer the motor vehicle and
3 disposed within the first and second sleeves.

1 3. The tunable impact absorption system of claim 1, wherein
2 the piston cylinder assembly is mounted within the first sleeve and the second
3 sleeve.

1 4. The tunable impact absorption system of claim 1, further
2 comprising a control volume for housing the plurality of igniters, the control
3 volume in communication with the piston cylinder assembly.

1 5. The tunable impact absorption system of claim 1, further
2 comprising an airbag deployment system having a plurality of igniters capable of
3 releasing a pressurized fluid when activated to pressurize the airbag deployment
4 system, the plurality of igniters activated by the controller during an impact event.

1 6. The tunable impact absorption system of claim 4, further
2 comprising a pneumatic line extending between the control volume and the
3 piston cylinder assembly for providing fluid communication between the control
4 volume and the piston cylinder assembly.

1 7. The tunable impact absorption system of claim 6, further
2 comprising a pressure release valve mounted between the control volume and
3 the steering column along the pneumatic line.

1 8. The tunable impact absorption system of claim 1, wherein the
2 plurality of sensors include a driver height sensor, a driver weight sensor, a chest
3 to wheel sensor, a seat position sensor, a seat belt sensor, a vehicle speed
4 sensor, and an impact sensor.

1 9. A method for tuning the energy absorption level of an impact
2 absorption system in a motor vehicle during an impact event, the method
3 comprising:

4 determining a minimum energy absorption level based on driver
5 and vehicle conditions;

6 determining severity of an impact event;

7 adjusting the minimum energy absorption level based on the
8 severity of the impact event if the severity of the impact event requires a greater
9 amount of energy absorption than the minimum energy absorption level; and

10 activating a safety device to absorb the minimum energy absorption
11 level during the impact event.

1 10. The method of claim 9, wherein determining the minimum
2 energy absorption level further includes reading a plurality of vehicle and driver
3 condition sensors.

1 11. The method of claim 9, wherein determining the severity of
2 an impact event includes reading an impact sensor.

1 12. The method of claim 9, wherein the safety device is
2 activated in stages for absorbing different levels of impact energy and activating
3 a safety device includes activating a minimum number of stages to absorb the
4 minimum impact absorption level.

1 13. The method of claim 12, wherein activating a safety device
2 includes activating an airbag deployment system.

1 14. The method of claim 12, wherein activating a safety device
2 includes activating a collapsible steering column system.